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# ETON COLLEGE ATLAS,

PART I.

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## TEN MAPS

ILLUSTRATIVE OF

# PHYSICAL GEOGRAPHY,

DESIGNED BY

THE REV. C. G. NICOLAY,

FELLOW OF THE ROYAL GEOGRAPHICAL SOCIETY;

LATE LECTURER ON GEOGRAPHY AT KING'S COLLEGE, LONDON,

ETC. ETC.

ENGRAVED BY

EDWARD WELLER, F.R.G.S.

WITH

DESCRIPTIVE AND EXPLANATORY INTRODUCTION TO EACH MAP.

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MDCCCLVIII.



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BY

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FELLOW OF THE ROYAL GEOGRAPHICAL SOCIETY, AND LATE LECTURER ON GEOGRAPHY  
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# EXPLANATORY INTRODUCTION TO THE MAPS.

THE object of this Series of Maps is to exhibit the elements of Physical Geography—a science which is connected with nearly all the great phenomena of nature. The important facts and principles of meteorology—the classification of atmospheric changes—the laws which regulate the temperature, winds, and rain, and enable us to calculate even the course of the tornado,—these are among the most important discoveries of the present century.

Not less wonderful are the phenomena of the Ocean. The number, variety, and vast extent of its currents—the mystery which yet hangs over their origin, and their important influence on navigation—form another class of the most interesting subjects for inquiry.

Physical Geography also shews the influence of mountains and lowlands on the course and magnitude of rivers—on the fertility of countries—the civilization of their inhabitants—and the permanent settlement of certain races of men in particular regions.

The extent of volcanic action, and the wonderful changes which are being produced by the works of the coral polypi, in forming new groups of islands in the Pacific, add still further to the importance of the science which explains the operation of the great laws ever at work upon the earth.

## Map I.

### CHART OF THE WORLD ON MERCATOR'S PROJECTION, WITH THE CIRCUMPOLAR REGIONS.

#### DESCRIPTION OF MERCATOR'S PROJECTION.\*

THE great object of Mercator's Projection is to shew, by *straight* lines, the directions in which a ship must sail to reach any desired port. In such maps, all the meridians are straight lines, and parallel; and the space between any two meridians is of the same length in all latitudes, instead of decreasing as we approach the poles.

To illustrate this point, compare Map II. with Map X. (*Pacific Ocean*.) Now, if the spaces between any two meridians on this latter map were to be made of the same length at the Arctic circle as they are at the Equator, the reader will see at a glance, that all the northern countries and seas would appear of more than twice their proper width. How then is this distortion of the regions in the higher latitudes to be prevented? In Map X. it is evident, that the *difference* between the degrees of longitude and those of latitude increases as the poles are approached. Now let the reader again look at Map II. and he will see, that Mercator's Projection preserves, but in *straight* lines, this *proportion* between the arcs of the meridians and the lines of latitude. Here, however, the degrees of longitude, instead of gradually decreasing, remain of the same length, but the degrees of latitude are made to increase according to a mathematical principle, which it is unnecessary to explain in this notice.

The maps on Mercator's Projection are seldom constructed for higher latitudes than 80°, and no

\* The author of this Projection was Gerard Mercator, a Fleming, who died in 1594; but the principle of properly constructing the maps is due to Edward Wright, a mathematician of Caius College, Cambridge, who died 1615. On the early charts, all the degrees of latitude were drawn of the same length: Mercator partly corrected this, but was ignorant of the principle for fixing the distance of the parallels of latitude. Wright discovered this, and it was yet more fully illustrated by Bond, and demonstrated by James Gregory and Halley.

space would suffice to represent the difference between the degrees of longitude and latitude near, or at, the poles. A degree of longitude in latitude 89°, is little more than a mile in length; while a degree of latitude measures above 69 English miles. At the poles, a degree of longitude is of course 0°. Now although a Mercator's map might be constructed to represent the surface of the earth in latitude 89°, it would be impossible in latitude 90°.

#### CIRCUMPOLAR REGIONS.

We see by this portion of the chart the great difference in the distribution of land and water, which characterizes the Arctic and Antarctic regions. Whilst, in the one, the land stretches on all sides towards the pole, the other presents little besides the ocean. Victoria Land, discovered in 1841 by Sir James Ross, displays a long line of mountainous coast, and many lofty volcanic peaks. Masses of impenetrable ice line the coast, and future discoverers have yet to finish the survey of the Antarctic lands.

These circumpolar charts enable the student to mark with exactness the points of the great continents which approach nearest to the poles, and the relative positions of the Arctic islands, countries, and seas.

#### THE GREAT CIRCLES.

These circles do not at the first view seem to be lines of *shortest* routes. Take, for example, that arc of a great circle, which connects the Cape of Good Hope with Melbourne in Australia. This arc shews the shortest possible road between the two places, but it will not appear so to *all* who look at the chart. Let such remember, that the track of a ship is over the surface of a *sphere*, whereas the chart is a *flat* surface. Let them also compare the relative positions of the Cape and of Melbourne on a globe, connecting the places by a flexible slip of metal or card-board, which of course will be the arc of nearest distance along which a ship can sail from one port to the other. It will then be seen how the various arcs drawn on the chart do really represent the lines of *shortest* distance.

### THE OCEAN CURRENTS.

These may, perhaps, be conveniently classed as *cold* and *warm* currents:—

#### *The Cold Currents.*

*The South-polar Current.*—At the bottom of the chart, lines and arrows are seen, which shew that a current is moving northwards from the Pole through the whole width of the Pacific ocean. At Cape Horn it is broken, but a part flows along the American coast, until near the Equator, where, turning to the west, it is gradually lost in a warm current. Another part of the South-polar current appears to reach the Cape of Good Hope, where it too is lost in other ocean streams. The remaining mass of this cold current is borne onwards to Australia, and disappears amongst the numerous isles of the Indian Ocean.

*The North-polar Current.*—This body of cold water pours down from Baffin's Bay, through Davis' Strait, bringing huge icebergs and vast fields of packed ice far down to the south, and pouring its cold current along the whole sea-board of the United States.

#### *The Warm Currents.*

*The Gulf Stream.*—This extraordinary ocean-stream begins in the Gulf of Mexico, passes along the American coast to Newfoundland, and thence crosses the Atlantic to the British Isles, having forced its way for 6000 miles through the mass of the ocean.

*The Mozambique Current.*—This originates in the Bay of Bengal, whence it flows across the Indian Ocean to the Cape of Good Hope.

*The Japan Current* originates in that great centre of ocean currents, the Isles of the Eastern Archipelago: it then travels northwards, past Japan, and towards the Aleutian Isles, through which a part forces its way into Behring's Strait. But this barrier of isles compels the greatest mass of the current to turn southwards, and flow towards the American coast.

*The New-Guinea Current* may be seen flowing from the Feejee Isles, and between New-Guinea and Australia, after which it unites with the warm current moving towards Africa.

*The Equatorial Current.*—The chart exhibits a warm current, which originates to the south of the Gulf of Guinea, and flows across the Atlantic to the coast of Brazil. It then divides into two branches, one, rushing southwards from Cape St. Roque, is known as the Brazil Current, which, being deflected by the headlands of the coast, turns to the east, and is carried towards the Cape of Good Hope. The northern branch sweeps onwards to the mouth of the Amazon, and is slightly turned from its course by the volume of water poured out by this river. Passing into the Gulf of Mexico, it then either mingles with, or perhaps forms the Gulf stream.

This may be called the *Atlantic Equatorial Current*. But an examination of the chart will

enable us to see the direction in which the *Pacific Equatorial Currents* flow. To the west of America vast ocean-streams of warm water are seen moving westwards, whilst a counter current, also warm, proceeds eastwards, immediately north of the Equator. The width of these equatorial currents is not less than 3000 miles in this part of the ocean. The eastern parts of the Pacific exhibit similar phenomena. Currents and counter-currents, all warmer than the mass of the ocean, keep its waters in perpetual agitation.

*North African Current.*—This begins in the Bay of Biscay, whence it flows to the south, along the coasts of Spain and Portugal, and sends through the Straits of Gibraltar a strong current into the Mediterranean. It then passes along the African coast to Cape Verd, and, turning to the east, holds a course of 1000 miles to the Bight of Biafra, having been flowing in close proximity, but in the opposite direction, to the Equatorial Current.

*Rennell's Current.*—This, like the North African Current, also originates in the Bay of Biscay, from which it proceeds along the French coast, crosses the mouths of the English and Irish channels, and finally, curving round to the south and east, returns towards its source. It is a branch of this current which so often endangers ships when off the Scilly Isles.

### THE CURRENT CENTRES.

A very slight inspection of the chart will shew that certain groups of islands and bold headlands are the centres where currents originate, or are broken and deflected into new streams. The isles of the Eastern Archipelago, Cape Comorin, the Cape of Good Hope, the Gulf of Guinea, Gulf of Mexico, and the Bay of Biscay, are among the most important of these current centres.

### THE CURRENT CURVES.

The remarkable curves made by many of the currents in their course must excite attention. Some of these completely encircle certain parts of the ocean, thus forming vast oceanic vortices. Two such curved currents are marked in the east of the Pacific,—one remarkable instance is in the Atlantic, and other examples are shewn in the western regions of the Pacific.

### THE SARGASSO SEA.

This vast body of water, covered as far as the eye can reach with a marine vegetation, is surrounded and completely cut off from the body of the Atlantic by the great current curves. The sailors of Columbus were awe-struck by the sight of endless fields of sea-weed floating on the waters; and, from the days of Columbus to the present, the origin of this Atlantic vegetation has been a problem often proposed, but not yet solved. The Portuguese called it *Mar de Sargasso* ("the weedy sea"), and the term Sargasso is yet in use. The area of this sea is reckoned to be equal to that of France, but in one part the long line of sea-weed extends for 1200 miles.

## RIVER DRAINAGE OF THE CONTINENTS.

The Chart exhibits a general view of the surfaces which send off the waters to the two great oceans. Thus it will be seen, that nearly the whole of the American rivers fall into the Atlantic. The rocky mountains and the Andes form the great watershed, or dividing line, which separates the waters falling into the Pacific from those which fall into the Atlantic.

Most of the drainage of Europe falls into the Atlantic, or into the seas and gulfs connected with its waters. The Arctic Ocean, however, receives some of the European rivers, and a large part of the eastern surface is drained by the Volga.

The waters of Western and Northern Africa also fall into the Atlantic, to which must be added the drainage of Abyssinia, Nubia, and Egypt, brought down by the Nile.

Thus the *Atlantic* receives the rivers of three continents, a fact which illustrates the importance of this ocean in connection with the progress of the human race.

The *Pacific* receives a few rivers of Western America; but all its important streams are from Eastern and Southern Asia. This ocean has therefore ever been connected with the condition of the Asiatic nations.

The *Arctic* Ocean receives the waters from a vast Asiatic area; but the historical importance of the regions drained by the Lena, the Yenisei, and the Obi has been hitherto but little felt.

## Map II.—Chart of the World.

## TEMPERATURE, RAINS, WINDS, &amp;c.

## TEMPERATURE.

In this Chart, the *dark* lines shew the average temperature for January, *at the level of the sea*. In the northern part of the globe, they indicate the greatest cold of winter; and in the southern, the greatest heat of summer. The *dotted* lines denote the average temperature in July at all the places through which they pass. These may therefore be called the summer lines of the northern countries, and the winter lines of the regions lying south of the Equator. Thus, the dotted line of 60°, which passes over North America, the British Isles, and the northern countries of Europe, shews the mean July heat in all those regions. Those dark lines, which have the negative sign (—) prefixed to the figures, represent degrees of cold *below zero*, of Fahrenheit's thermometer. Thus, the lines crossing latitude 75° N. having the figures -20, -30, and -40 attached, denote the January cold of those districts to be 20°, 30° and 40° degrees *below zero*, or 52°, 62°, and 72°, respectively, below the freezing point. The dotted lines which turn furthest to the south have no negative symbols, for such intense cold has not been noted in the ocean-covered regions of the south.

The extraordinary curves made by the lines of equal temperature, especially in the northern

hemisphere, must arrest the attention of the geographical student. Thus, he will find, that in January the thermometer stands at 40° on the west coast of America, in lat. 45° N., and also at the same point in the Faroe Isles, in lat. 62° N., and, following the course of the line, he will see that a part of China, in lat. 30° N., has the same January temperature, though the Faroe Isles are within a few degrees of the Arctic circle.

Still more remarkable is the curve made by the line which shews the places where the thermometer stands at zero, or 32° below freezing point, in January. In America, it crosses the south part of Hudson's Bay, and then, curving to the north, intersects Spitzbergen. The line is next deflected far to the south, across Asia. Thus, the wandering Tartar suffers as intense a cold as the native of a place far within the Arctic region. Some of the lines for July exhibit curves nearly as surprising. Thus, the dotted line to the north of the Equator, shewing the temperature of 60°, crosses a large portion of Siberia within the Arctic circle; but the same line also intersects England, Ireland, and the Gulf of St. Lawrence.

Three systems of these temperature curves are shewn in the north portion of the chart; two having a flexure northwards, and the third towards the south. The former are on the west coast of North America, and in the high latitudes of the Atlantic; the latter coincides with the basin of the river Lena.

An inspection of these lines will at once shew where the winters are coldest, and the summers hottest. In Siberia, we see a district intersected by the meridian of 120° E., in which the thermometer falls to 40° below zero, or 72° below freezing point, in the month of January. Another cold district is seen in North America, latitude 80°, and longitude 90° West.

The *extreme variations of temperature* at certain places are clearly shewn by some of the lines. Thus we see, in one part of Siberia, the cold of January is denoted by 72° below freezing point, while the July temperature in the same district is 60°, giving a difference of 100° between the winter and summer. The lines shew an *average* difference of only 20° of temperature for England. Those who wish to note these variations may consult the tables at p. 222, in *Nicolay's Principles of Physical Geography*, (ETON: E. P. Williams.)

## THE RAINS.

This chart divides the earth, in respect to the distribution of rain into six districts:—

## 1. The Rainless Regions.

Two of these are in America,—one extending over the highlands of Mexico, and the other along the coast of Peru. But the most remarkable of the rainless regions is the singular zone, which begins on the west coast of Africa, crosses the Sahara, the table lands of Arabia and Persia, and penetrates to the neighbourhood of the Indus. It re-appears in Tibet, and, spreading out far and wide into the Shamo, a sea of sand, extends into China.

### 2. The Regions of almost Constant Rains.

These are shewn in the chart by the *dark* zone, a little north of the Equator. Within this belt we have a remarkable climate—little wind, almost incessant thunder storms, intense heats, and rain almost daily.

### 3. The Tropical Rains.

When the Sun is north of the Equator, (from March to September,) sudden storms and violent rains, remarkable, as Humboldt writes, for “drops of enormous size,” prevail in the countries between the Equatorial line and the tropic of Cancer. These rains are heaviest where the Sun is in the zenith. When the Sun passes to the south, the same phenomena are seen in the regions south of the Equator. Thus, between the tropics, the year is naturally divided into two portions—the wet, and the dry. This is the *general* law. Some districts near the equator have *four* seasons in the year—two wet, and two dry.

### 4. Regions of Winter Rains.

The south of Europe and north of Africa, are characterized by the prevalence of winter rains. The same observation applies to Asia Minor, and to the countries south of the Caspian. These regions in the northern parts of our hemisphere may be described as lying along the parallel of 40° N. lat. North America too has her winter-rain district, lying to the west of the great lakes, and along lat. 50° N. The west coast of Patagonia and the south-east coast of Australia have also the rains in their winter seasons.

### 5. Regions of Autumn Rains.

These, in Europe, extend to the north of the last-mentioned district, and include nearly all Western Europe.

### 6. Regions of Summer Rains.

This is an extensive district, stretching from the eastern parts of France, and the Netherlands, through Northern Germany, over the east of Europe, and across Siberia. It will also be observed, that the regions of summer rains include the south-east of the United States, and a long range of the Patagonian coast.

The annual depth of the rain-fall in these different regions is greatest in the countries bordering on the Equator. Humboldt has calculated the mean annual depth of rain at the Equator to be 96 inches; in latitude 45°, at 29 inches; and not more than 17 inches in latitude 60°. This statement probably expresses a *general* truth, but many circumstances produce remarkable deviations. Thus, 400 inches have fallen in a year at Sierra Leone; and though the mean for England is 31 inches, there fell in one year 67 inches at Keswick, in Cumberland.

It will be observed, that the chart is so shaded, as to exhibit the proportion of rain that falls annually. Some parts of America, at a distance from the Equator, have clearly a great fall of rain.

## THE WINDS.

Five different classes of winds are exhibited on the chart:—

### 1. The Calms.

These are the light and flickering breezes, which gently stir the air along a narrow zone north of the Equator. This region may be about 300 miles wide, and in it, at certain times, the air is so still that the lightest sail hangs motionless. This region is remarkable as lying *between* the two ever-moving trade-winds. There are also two other regions of calms, or rather of light and variable breezes; one lies north of the trade-winds, and the other south. The former region is called the Calms of *Cancer*, the latter of *Capricorn*.

### 2. The Trade-Winds.

The regions of the north-east and the south-east trade-winds are indicated on the chart. These currents of air extend on both sides of the Equator, to some distance beyond the Tropics, and therefore each trade-wind sweeps over a space of above 2000 miles on both sides of the Equatorial line. When the region of these winds is once fairly entered, the ship proceeds easily onwards before a uniform and pleasant breeze. Such is the north-east trade-wind in the Atlantic, between the Canaries and America, a part of the ocean called the “Ladies’ Sea.” For the causes of these winds, see *Nicolay’s Physical Geography*, pp. 163-4.

### 3. Constant Winds.

There are certain regions, over which the winds blow from the same point for the whole year, or for several months together. One such region, that of the *south-west* winds of the Atlantic between Europe and North America, is marked in the chart between the latitudes of 30° and 45°. This wind is constantly blowing towards the great Sahara desert. The influence of this current is seen in the navigation between England and the United States; the voyage from New York to Liverpool being performed in much less time than from Liverpool to New York. To the west of America, *north-west* and *west* winds are found, and a West current is constantly blowing towards the Patagonian coast. The South Pacific is also swept, as the chart indicates, by westerly breezes. The student will observe that these west currents blow in a contrary direction to the trade-winds, and that they occupy the zones which extend far to the north and south of the trades. Thus, the chart shews two atmospheric currents from the east, and two from the west, forming a double system of winds.

### 4. Monsoons.

These are periodical winds, which blow from the north-east for about five months, from October to April, and from the south-west from April to October. Some weeks are required to effect the change, and this is the time of the storms in those seas. The Monsoon-region extends, as shewn in the chart, from Africa to China.

### 5. Hurricanes.

It will be seen from the chart, that one hurricane-district extends from Madagascar to China, and that the other is in the Gulf of Mexico. These storms are called *Typhoons* in the Chinese Seas, and *Hurricanes* in the West Indies; but the names *Cyclones* and *Tornadoes* are also used to designate one peculiarity of these tempests, *viz.* the *rotatory* motion, which renders them so destructive to ships. In the South Ocean the hurricane rotates from west to east, then to south, and so to the west again, or as the hands of a watch move: but to the north of the Equator the storm revolves in the opposite direction. Besides this circular motion, round its centre, each hurricane has a *forward* movement across the ocean, at the rate, sometimes, of 40 miles in the hour. In consequence of this circular motion, the hurricane blows in different directions at its opposite sides. Thus, while the storm rushes from the west on one side of the circle, it will come from the east on the other. The same ship or island may, therefore, be struck first in one direction, and soon after in the opposite, as the tornado passes over. One of these storms has been known to pass over 3000 miles in a week, and, on two occasions, hurricanes have reached even the British coast. The width of these circular storms is very various; some have extended over a diameter of 500 miles. (See *Nicolay's Physical Geography*, pp. 167-172).

## Map III.—Physical Map of Europe.

### THE MOUNTAINS AND HIGHLANDS.

The mountain-systems exhibited in this map consist of two classes,—the *insulated* groups, and the *connected* chains. The following may be regarded as belonging to the first:—

*The Scandinavian Mountains.*—This group consists of the great Norwegian chain, the *Norriska Fiellen* and the *Dovre Field*, which extend for 1000 miles from north to south, and rise, in the desolate heights of Schnee-hattan, to an elevation of 8000 feet above the sea. This range is altogether insulated from other highlands, unless indeed where it sinks into the slightly elevated table-land of the north.

*The British Mountains and Highlands.*—These may in general terms be divided into three systems,—two of mountains, and one of hills. The *Scotch* mountains cover a wild district in the north-west and north of the island, rising in Ben Nevis to a height of more than 4000 feet. The *Scottish* mountain-system is broken into several groups by the river basins, and, towards the south, gradually sinks into the hill-system of England.

The *Welsh* mountains, rising in Snowdon and Cader-Iris to an elevation of 3500 feet, form the second system.

The *English* hill-system rises on the north to a mountainous elevation, some of the Cumberland heights being more than 3000 feet; but in general

the centre and south of the island are intersected by ranges of hills seldom raised more than 1000 feet above the sea level.

The area of this high ground is indicated by the parts coloured brown, which in Ireland are chiefly found in the north, east, and south.

*The Spanish Mountains.*—The whole of Spain is a table-land, crossed by five chains, the longest and most elevated being the great natural rampart of the Pyrenees. This range is about 270 miles long, and rises at its loftiest point to 11,000 feet. Even the level table-land in the north of Spain is more than 2000 feet above the sea.

*The North-African Mountains.*—This is another of the insulated groups, and has a close resemblance to the Spanish system. It consists of at least two extensive ranges, one near the Mediterranean, the other farther inland, which rises in some parts to more than 12,000 feet.

*The Ural Mountains.*—This is the last of the insulated groups delineated on the map, but it has a peculiar importance, being a natural boundary line for 1250 miles between Europe and Asia. The loftiest summits do not reach above 5000 feet in height, and the range gradually descends on the south to the level of the lowlands bordering on the Caspian Sea.

*The Connected Groups of Central Europe.*—An examination of the map will shew that all the mountain-ranges which stretch from France to Turkey belong to two great systems, separated by the basins of the Rhine and the Danube. Let us first trace the connection between the different parts of the *Southern* group. The Jura is united to the Western Alps: the Apennines are clearly an offshoot from the Alps; and we can trace this chain, under various names, across Italy, down the eastern shore of the Adriatic, and through Turkey, where we recognize it in the Balkan range. The famous mountains which intersect Greece are but branches of the great chain we have been following.

The *Northern* group is shewn with equal clearness to consist of closely connected ranges. The Harz, the Moravian, the Bohemian, and the Carpathian mountains, are all united by a succession of elevated lands, or transverse chains. Thus, a remarkable connection exists between the apparently dissimilar mountain regions of Europe.

*Table-Lands.*—Two extensive table-lands are shewn on the map, neither of which attains an elevation of more than 1000 feet above the level of the sea. One extends across the north of Russia, from the Dwina to the Ural Mountains. A line of low hills can be traced along its Northern boundary, beginning with the *Valdai* heights, and extending in a N.E. direction.

The second table-land is shewn on the map, bounded by the Carpathian Mountains on the S.W. and to the N.E. by the low districts lying along the Dneiper.

### THE LOWLANDS.

These regions are coloured green, and it will be remarked that an extensive and low plain stretches

nearly across Europe, from the coasts of Holland to the Ural Mountains.

The north of Belgium, all Holland, great portions of Hanover and Prussia, the whole of Denmark, and all the south-east of Russia, are occupied by this vast plain. Near the Vistula, a table-land nearly divides the east from the west districts, but the valley of that river maintains the connection. Part of this region is covered with swamps, which extend for hundreds of miles. Other districts consist of treeless wastes, called *steppes*. This is the great lowland of Europe.

It will be seen that a narrow strip of lowland runs along the shore of the Baltic, and the Gulfs of Bothnia and Finland.

The east part of England and the centre of Ireland, are lowlands.

The valleys of the great rivers are especially marked out by the alluvial or fertile character of their basins.

A long line of low and fertile land extends in Africa between the Atlas mountains and the desert.

The sandy waste of the Sahara, stretching 1000 miles from E. to W., is a remarkable example of a desert lowland.

#### THE RIVERS AND WATER-SHEDS.

*The Water-sheds.*—A Water-shed is that range of mountains, or ridge of highland, in which the rivers of a country rise, and by which the *waters* of a district are *shed* off, or turned in a particular direction. The mere inspection of the courses of rivers, as marked upon a map, will always guide the eye to the water-sheds of the region.

In Europe two great water-systems are shewn. The first water-shed consists of that ridge of slightly elevated land which runs across the north of Russia, from the valley of the Vistula, to the Ural Mountains, and which divides the rivers flowing into the Arctic Ocean from those falling into the Caspian and the Black Seas.

The second great water-shed is formed by the Alps and the mountains of Central Germany. This causes the waters on one side to flow to the north-west and the west, and all on the other towards the south and south-east. These are the two *great* systems; but each includes within itself many smaller systems, which any large and good map will shew.

The British, Scandinavian, and Spanish water-sheds are of course independent systems, requiring a separate examination.

#### THE INLAND SEAS.

An inspection of the map shews how deeply the ocean penetrates into Europe.

The *Mediterranean* covers 760,000 square miles, and communicates, by its rivers, with the heart of Europe and the remote regions of Abyssinia.

The *Black Sea* extends over 190,000 square miles, and drains a surface of nearly 1,000,000 square miles.

The *Baltic* has an area of 125,000 square miles, and receives about 250 rivers, which carry one-fifth of all the waters of Europe into its basin.

The *White Sea* is of the least importance, but it has a surface of 44,000 square miles.

#### RACES OF MEN.

The principal races inhabiting Europe are *three*, the *Teutonic* (Germanic), *Celtic*, and *Slavonian*. The first prevails in Germany, Holland, Denmark, Sweden, Norway, the regions round the Baltic, and throughout the greater part of the British Isles. The *Celtic* race is chiefly found in the north of Spain, the south and the west of France, in the north of Scotland, and in Ireland and Wales. The *Slavonian* nations extend from the Elbe to the Ural Mountains, including the pure Russians, the Bohemians, Moravians, Poles, Bulgarians, and some other kindred races. But besides these three principal races, there are others, such as the Turks, the Fins, and Samoyedes in the north, with the Tartar races of South Russia.

### Map IV.—Physical Map of Africa.

#### THE MOUNTAINS AND HIGHLANDS.

These appear on the map in three great systems,—the south, east, and west ranges.

The *South* highlands cover almost the whole of Africa, to the south of the Equator. The ranges are not in general of great elevation, although north of the Cape some mountains attain the height of 6000 feet above the sea level; and at one point a rise of even 10,000 feet is noted. The most remarkable fact connected with this group is, that it gradually descends on all sides by a series of *terraces*: the whole line of the slope is therefore a succession of table-lands. These terraces are in some places noted for their peculiarly dry and barren character, one series on the Atlantic coast being without a single river for 900 miles.

The *Eastern* highlands consist of the extensive table-land and mountains of Abyssinia, rising in some parts to an elevation of 14,000 feet, and characterized in others by table-lands, intersecting at a great height the Alpine masses, from which the Tacazze carries the floods of many cataracts to the Nile.

The *Western* mountain group stretches from Sierra Leone, across the valley of the Niger, to the central lowlands, round Lake Tchad. The western heights are called the *Kong*, and the eastern the *Muri* Mountains.

#### THE LOWLANDS.

These are found in the lake and river basins.

The most remarkable is the extensive alluvial plain which surrounds lake Tchad, a large portion of which is at one time of the year a swamp, stretching on all sides as far as the eye can reach.

Another river lowland lies between the Senegal and the Gambia, forming the alluvial plains of Senegambia.

A line of lowland extends along the coast, from Sierra Leone to the delta of the Niger, where it widens, forming a vast level. From this point the plains become narrower, but still follow the line of the coast, until all fertility ceases in the sterile terrace-regions.

Another strip of lowland is found on the eastern coast, from Port Natal to the countries beyond the Zambeze. The delta of this river forms another marshy plain, covered for miles with forests of bamboos.

Salt plains extend for many miles over some of the inland districts. The most remarkable is found in Abyssinia, where there is a long flat district, from the surface of which pure salt is cut in solid cakes by the natives.

#### THE RIVERS AND WATER-SHEDS.

The river-systems of this part of Africa may be comprehended in five classes, marked out by the great water-sheds.

The *first* is the *south-east* system, formed by the mountains which stretch from the Cape to Delagoa Bay, on the east. This range divides the short rivers which flow to the east, from the Orange River and other streams.

The *second* water-shed is the high range of the *Mosamba* ridge, which separates the waters of the Zambeze from those of the *Congo* and *Coanso* rivers.

The *Kong* Mountains form the *third* water-shed, from which the Niger and the numerous rivers of Guinea flow.

The *fourth* river-system depends on the line of hills which runs from the north-east shores of Lake N'yassi to Mount Kinea, and whence the waters of a large region descend to the eastern coast.

The *fifth* and last of these great African water-sheds is found in the mountain-system of Abyssinia, and the highlands which extend to the south-west.

#### AFRICAN LAKES.

Lake *Tchad* seems by far the most remarkable: placed in a low region, it receives the waters of Central Africa.

*N'yassi* is a lake of great, but unknown length, and lies parallel to a mountain range. According to some reports, it is above 700 miles long.

Lake *Dembea* is on one side of the table-lands of Abyssinia, is about 65 miles in length, and is traversed through its whole extent by the Blue Nile.

#### AFRICAN RACES.

The *Hottentots* and *Caffres* are the two principal nations of South Africa; but the *Negroes*, or people of Central Africa, are the most numerous of the native races. The *Galla* tribes fill the country south of Abyssinia; the *Arabs* are found scattered over the north and the centre; the *Berber* tribes dwell in the regions of the Atlas; and the *Copts* cultivate the plains of Egypt.

### Map V.—Physical Map of Asia.

#### THE MOUNTAINS AND HIGHLANDS.

The mountains and highlands of Central Asia may be said to form one vast connected system. If we begin at the Elburz chain, to the south of the Caspian Sea, we find a continuous range running to the Hindoo Coosh, and to the western edges of the Himalayas, which the *Karakoran* and *Kuen-Lun* mountains connect with the Chinese ranges. These are united to the eastern ridges of the Altai by a line of hills, which skirt the desert of Gobi to the east and north. This elevated desert may itself be called the link between the *Kuen-Lun* and the *Thian-Shan* mountains. The whole of this vast region may be looked upon as forming one system of highlands, extending from the Himalaya to the Altai in one direction, and from China to the Caspian Sea on the other. The whole system consists of seven ranges,—the Elburz, the *Gaghatay*, the Hindoo Coosh, the Himalaya, the *Kuen-Lun*, the *Thian-Shan*, the Altai, and the Chinese. It also includes the two great deserts of Tibet and Gobi. The height of this area may be estimated from the following statements:—*Kunchinging*, in the Himalayas, is 28,178 feet above the sea; *Kohibaba*, in the Hindoo Coosh, 17,905 feet; desert of Gobi, in its highest part, 12,000 feet; and Mount Beluka, in the Altai, 11,062 feet. Besides this great central system of Asiatic highlands, there are the inferior, though very important, ranges of Asia Minor, Palestine, and Arabia; the Caucasian group; the mountains of Southern and Central India; the Malaya and Cambodia chains; the East Siberian ranges; and the *Yabloni* and *Stanovi* hills.

It will be remarked, that as the Caspian is connected with the Chinese ocean by the ranges running east and west, so the Arctic ocean is united to the Indian by the chains which extend northwards from Malacca, through China, to the Siberian mountains.

The two great *table-lands* of Asia are those of Tibet and Gobi,—the former rising in some parts 12,000 feet above the sea, and the latter, extending for 1800 miles in length, attains an equal elevation. The *Shamo*, or "sea of sand," is not so high, it being a valley running for many hundreds of miles below the level of the surrounding desert. If the Persian table-land, also a desert, be added to the others, we shall then have a desert region stretching across Asia for 5000 miles. Nor must we forget the Indian desert, south of the Punjab, which is a sandy waste, larger than England.

The great central mountain-system descends on all sides by a series of terrace slopes, down which the great rivers fall, in a long succession of mountain cataracts. Eleven or twelve of these great terrace districts are found in the north, south, and east of the central mass.

#### THE LOWLANDS.

Most of these lie in the great river valleys.



The *Siberian* lowlands form the most extensive system, covering an area of 4,000,000 square miles, a surface equal to that of Europe. The next extensive lowlands are those of the Ganges and the Indus, after which come the plains of the Caspian, the swampy flats of Lake Aral, and the Khirghiz steppes, separating the Altai from the Ural mountains. The plains of the Euphrates and Tigris are the only extensive lowlands of Western Asia. The basins of these two rivers extend over 230,000 square miles.

The fertile plains of *China*, intersected by numerous rivers, present a rich area of about 210,000 square miles.

#### THE RIVERS OF ASIA.

These may be arranged in three systems, the northern, the western, and the southern waters.

The *northern* class includes the three Siberian rivers, which descend from the great water-shed of the Altai;—the *Lena*, rising near Lake Baikal, and flowing 1900 miles; the *Yenisei*, having its source in the Baikalian mountains, and running for 2500 miles to the Arctic ocean; and the *Obi*, issuing from the recesses of the Altai, and pouring its waters for 2000 miles through Siberia.

The *western* rivers are;—the *Amoor*, which flows by the birth-place of Genghis Khan, and falls into the gulf of Saghalien, after a course of 2000 miles; the *Hoang-ho*, having the same length; and the *Yang-tse-kiang*, which waters China for 2900 miles.

The *southern* rivers are six in number;—the *Indus*, which rises in the Karakoran mountains, at an elevation of 15,000 feet, breaks through the valleys of the Himalayas, and, sweeping through the Punjab and many a desert region, falls into the sea after a course of 1500 miles. The *Ganges* begins in a magnificent glacier, flows through the noblest cities of India, fertilizes the plain of Bengal, and pours into the ocean through the swamps of the Sonderbunds, having also flowed about 1500 miles. The *Brahmapootra* rises north of the Himalayas, runs eastwards through a long mountain valley, and then, winding through the ravines of the mountains, passes southwards to unite with the Ganges. The *Irrawady*, the *Menam*, and the *Maykiang* drain vast regions, almost unknown to Europeans.

#### THE LAKES OF ASIA.

These are nearly all in the north and central regions, and principally in the high or desert countries. Three of the most important lakes are, however, placed in low districts. The Dead Sea, the Caspian Sea, and the Aral lake occupy remarkable depressions. The valley of the Dead Sea is perhaps the most singular on the face of the earth, extending from the gulf of Akabah to the mountains of Lebanon, the surface of the Dead Sea being 1300 feet below the level of the Ocean. The Caspian and the Aral both lie in hollows of the land, the surface of the former being 83 feet below the sea level. The waters of these three lakes are salt.

Lake *Baikal*, called the Holy Sea by the natives,

lies between lat. 50° and 56° N., and in 108° E. It is said to cover an area equal to the half of Scotland, and is about 1,800 feet above the sea. One hundred and sixty rivers flow into this lake.

The Lake of *Tengri* is the principal one in Tibet, and is called the "Celestial Lake." The meridian of 90° E. passes through it, and the meridian of 100° E. passes through the Lake of *Koko-Nor*, which gives a name to the table-land around. It must be sufficient here to say, that lakes abound on many of the Asiatic table-lands, and in the lower regions. The plain between the Ural Mountains and the River *Irtish* is one example of this, the whole district being covered with small lakes.

#### THE ISLANDS.

These require little notice in this place, as an account of them will be found in a description of the Pacific groups in Map X. It may, however, be right to remind the reader, that the Maldives and Laccadives are coral formations, both clusters consisting of Atolls.

#### THE RACES OF MEN.

The *Tshuktsches*, a branch of the Esquimaux, inhabit the north-east of Siberia; the numerous tribes of the *Turkish* family occupy the central table-lands, and extend to Asia Minor; a branch of the same people, the *Khirghiz* tribes, dwell on the western steppes; the *Samoedic* nations are dispersed along the shores of the Arctic Ocean; *Finnish* tribes are found along both sides of the Obi; the *Mongols* wander over the elevated region south of the Desert of Gobi; the *Buriates*, a numerous branch of the Mongols, encamp around lake Baikal; the *Calmuks* range from the frontiers of China to the Caspian Sea; the *Tungooses* are spread over all Northern Siberia, from the Yenisei to the Sea of Okhotsk. The *Yakutes* inhabit the same regions as the Tungooses. When to these nations we add the Hindus, Persians, Afghans, Armenians, and Arabs, few Asiatic people will remain unmentioned.

### Map VI.—Physical Map of North America.

#### THE MOUNTAINS AND HIGHLANDS.

The elevated regions are connected in one system of mountains and table-lands. This connection is evident to the eye by the brown colouring, which indicates the high grounds. There are however two mountain-chains, which must be considered as separate systems.

*The Rocky and Western Mountains.*—The delineation of these mountains exhibits a series of ranges, running nearly parallel with the coast. The loftiest ridge is separated from the Pacific by other and lower chains, which are themselves crossed by transverse ridges. This arrangement of the mountains forms many long river valleys, which follow the direction of the heights. The whole length of the chain may perhaps be 1,500 miles, and the range sends off at least two branches to the east: one, consisting of the Big Horn and Black Mountains, extends to the table-land east of the Mis-

souri; the other, under the name of the Ozark Mountains, runs to the Mississippi.

*The Alleghany Mountains.*—These extend from the swamps of the Mississippi to the mouth of the St. Lawrence, and consist, in general, of *parallel* chains, separated by picturesque and fertile valleys. In one part, a coal field extends for 700 miles.

*The Table-land of the Lakes.*—This singular tract of elevated land contains the sources of the Mississippi; but its distinguishing peculiarity is the innumerable lakes which diversify its surface, and extend far over the high plains to the south of Lake Superior.

#### THE LOWLANDS.

The most remarkable of these, and that which attracts the eye when we look at a physical map, is the great central plain through which the Mississippi and its tributaries flow. The varieties of its surface are great. In one part, south of the Black mountains, a desert of sand stretches for 400 miles; in another, magnificent forests, through which the Ohio rolls its waters. East of the Mississippi, the prairies stretch away to the Rocky Mountains. Thousands of square miles near the mouth of this great river are covered by marshes, and the gloomy pine forests darken extensive regions.

The long plain to the east of the Alleghanies is richly-cultivated and well-watered. Through it the rivers quietly meander, after their precipitous course across the highlands.

A swampy district is found on either side of Lake *Winipeg*, but the plain is not strictly classed with the lowlands, as it runs in some parts 1000 feet above the sea level.

The inundated region, called the *Black Swamp*, lies along the south and west of Lake *Erie*, and other regions of the same character are distributed over this part of the country.

The land immediately to the south and west of Hudson's Bay is also a low and swampy district, and to the west extends the wild plain called the *Barren Grounds*.

The delta of the *Mackenzie* river consists of lowlands and islands, which extend for about 100 miles. This plain is beyond the latitude at which trees grow, as the map shews.

#### THE WATER-SHEDS.

The *first* is formed by a line of low hills running near the great Lakes, and dividing the plain of the Mississippi from the long region which descends to the Arctic Ocean. On one side, this ridge sends off hundreds of streams to Lake Superior, and ultimately to the St. Lawrence; on another it turns numerous rivers to the North, which are carried to the Arctic Ocean by the Mackenzie, Coppermine, and Great Fish Rivers. This important water-shed is, however, of very little elevation, seldom rising more than 700 feet above the sea.

The *Rocky* Mountains form the *second* great water-shed, which sends off to the east numerous

feeders of the Missouri, Mississippi, and other streams, falling into the Gulf of Mexico; and to the West, the Fraser, Columbia, and Colorado rivers.

The *third* principal water-shed is that of the Alleghany chain, which sends off, on one side, the Ohio, and the Tennessee, to the Mississippi; and, on the other, distributes over the Eastern States some of their most important and enriching streams. Thus the three great water-sheds originate *six* different river-systems.

#### THE LAKES.

The existence of these vast bodies of fresh water would alone give a peculiar physical character to a region. The five lakes Superior, Michigan, Huron, Erie, and Ontario, form one connected system of waters, and extend over an area equal to that of all England and Scotland. The *bottoms* of all these lakes, except Erie, are below the level of the sea, yet the *surface* of their waters is far above that elevation. Thus the surface of Lake Superior is 630 feet above the sea, yet its bottom is 270 feet below the surface of the ocean, a result of the great depth of this lake, *i.e.* 900 feet. (*Nicolay*, p. 200.)

The great and small *Winipeg* Lakes form a system by themselves, being separated from the rest by ridges of high land.

The *Athabasca*, *Slave*, and *Great Bear* Lakes form a connected system by means of the Mackenzie river, which flows through the first-named two, and is joined to the third by the Great Bear Lake river. Thus, from Lake Athabasca to the Arctic Ocean, one system of waters extends; and another from Lake Superior to the Atlantic.

#### THE RACES OF MEN.

The native tribes consist either of the Esquimaux or the Indians. The former people extend from Labrador and the Hudson's Bay country, across the whole continent, even to Behring's Straits. Eighteen or nineteen tribes of the Red Indians are widely distributed over the whole of North America, from Hudson's Bay to the Gulf of Mexico.

### Map VII.—The Physical Map of South America.

#### THE MOUNTAINS AND HIGHLANDS.

These consist of *three* systems:—

*The Andes.*—These follow the windings of the coast in a series of parallel chains, which frequently enclose high table lands, and sometimes are crossed by transverse ranges of huge mountain knots, covering, as at Loza, above 11,000 square miles. On one of the table-lands stands Potosi, at an elevation of 13,000 feet above the sea, and the river Desaguadero flows at an equal height in one of the valleys of this mighty chain, in which is also the Lake of Titicaca, said to be twenty times larger than the Lake of Geneva. The loftiest peaks have peculiar outlines; the volcanic being vast cones,

or having a needle-shaped appearance; while some of the mightiest resemble huge domes, especially when seen from a distance. The Patagonian Andes are the lowest, few peaks rising to 4000 feet; whilst in Chili, the summit of the Aconcagua peak is nearly 24,000 feet above the sea, and some of the Peruvian Andes rise to 22,000 feet.

*The Mountains of Guiana* form the second system of highlands, and consist of several parallel chains, none of which rise to 8000 feet above the sea.

*The Brazil Mountains.*—Brazil may be considered as one great table-land, crossed by many mountain ridges the highest summit being about 8400 feet above the sea.

#### THE LOWLANDS.

These are marked out in general by the river basins of the Orinoco, the Amazon, and La Plata. There are, however, other districts, not connected with the great rivers.

*The Patagonian Plains.*—These consist of a succession of desert terraces, gradually descending to the east, and covered for hundreds of miles with pebbles to the depth of forty or fifty feet.

*The Pampas.*—This vast plain is a remarkable contrast to that of Patagonia: here it is hard to find a pebble. The part nearest to the Andes is a swamp, the district further to the east is covered for three or four hundred miles with long and rich grass; while nearer to the river is a region of thistles, growing to more than eight feet high, and rendering the country impassable.

*The Silvas.*—This is the forest region of the Amazon, extending over a district five times larger than France, and running for about 1500 miles along the river. In some parts of this plain, a week's search would not enable us to find a single pebble.

*The Llanos.*—These are level plains, covered after the rainy season with rich verdure, but distinguished from the Silvas by the almost total absence of trees. The Llanos extend for about 1000 miles across the Continent.

#### THE RIVERS.

A glance at the map is sufficient to explain the system of the South American rivers. Three rivers arrest the attention, and these are, speaking generally, the means of draining the whole Continent. The Uruguay, Parana, and Paraguay, unite in the estuary of *La Plata*; the Amazon, receiving tributaries from all sides, carries off the waters of the central regions; and the *Orinoco* drains the northern mountains and plains. The student will not fail to note the singular union, or bifurcation, of the Orinoco with the Amazon by means of the river Cassiquiare, which flows from the Orinoco to the Rio Negro, and so into the Amazon. This proves the little elevation of the water-shed which separates the Orinoco from the Amazon.

#### THE RACES OF SOUTH AMERICA.

Many of the descendants of the ancient tribes

subdued by the Spaniards and Portuguese, possess the plains and the mountains of Peru and Brazil. The Peruvian Indians, who still keep the Quichua language, the tongue of the ancient Incas, and numerous other Aboriginal tribes, speaking a variety of dialects, maintain exclusive possession of many interior districts, which they jealously guard against the approach of the European.

### Map VIII.—The Physical Map of Central America.

This map shews the nature of the region uniting the two continents, and indicates the distribution of that remarkable chain of islands, which separates the Gulf of Mexico and the Caribbean Sea from the Atlantic.

*The Surface of the Isthmus.*—The chain of the Andes is not continued unbroken through the Isthmus, being completely divided by the low plains of Panama. If we begin our examination on the south side of the Isthmus, we shall find a plain extending for nearly 300 miles to Panama, and gradually rising as we advance northwards. We again meet with a high country in Veragua and Costa Rica. After this we again descend to the lowlands in the plain of Nicaragua, little raised above the level of the sea. The lake Nicaragua covers 30,000 square miles, having an elevation of only 128 feet. A line of volcanoes rises, however, between the lake and the Pacific, reminding the traveller of the mountain-ranges which he has left behind, and towards which he is approaching. Over this low district it has been proposed to form a ship canal from the Atlantic to the Pacific.

The table-land appears again in the Mosquito country, and turns north-west to the celebrated and lofty plain of Mexico, which is but part of a table-land stretching for 1500 miles from the Gulf of Tehuantepec to the Great Salt Lake in the north. The elevation at Mexico is 7430 feet above the sea. This lofty plain is intersected by a line of volcanoes, one of which, Popocatepetl, is 17,484 feet above the sea. This line of mountains is shewn in the map.

#### THE ISLANDS OF CENTRAL AMERICA.

These may be arranged in *four* groups;—the *Coast Islands*, off the shores of Venezuela; the *Lesser Antilles*, from Trinidad to the Virgin Isles; the *Greater Antilles*, Porto Rico, Hayti, Jamaica, and Cuba; and the *Bahamas*. Many of the Lesser Antilles have been raised from the sea, or subjected to volcanic agency; and all the groups have, for thousands of years, been exposed to the incessant action of the ocean currents, which pour through the channels between the different islands. Numerous coral reefs surround all the Antilles, and increase the dangers of the navigation. The Bahamas form a remarkable group, some standing on the marine formation called the Bahama Bank; and others, which are outside of the bank, rising from an almost unfathomable depth of the ocean. About 500 islands are found in this range, besides the innumerable reefs and shoals which rise on all

sides. The mountains of the Greater Antilles are lofty, rising in Haiti to 9000 feet, the Blue mountains of Jamaica to 6000, and those of Cuba to 8000 feet, above the sea.

The lonely group of the *Galapagos*, 700 miles from the American coast, rise from vast depths, and are in many points covered by masses of lava, and other evidences of volcanic action.

The *Bermudas* stand on a shoal, twenty-three miles long, and thirteen broad, the whole being surrounded by coral reefs, beyond which the rocks suddenly strike down into the Atlantic depths.

### Map IX.—The Physical Map of Australia and New Zealand.

#### AUSTRALIA.

This is for the greater part an unknown land, the regions of the coast only having been examined with any approach to accuracy.

#### THE HIGHLANDS.

The eastern coast is elevated, a range of granite mountains extending along that side throughout the whole length of the island, and rising, at Mount Kosciusko in the south, to a height of 6500 feet above the sea.

The western coast has no such lofty eminences, the highest peaks not being more than 1000 feet above the sea.

The north and south hills are comparatively low, consisting in some places of red sandstone rocks.

Most of the Australian mountains exhibit strata of limestone, sandstone, and masses of volcanic rocks.

*Van Diemen's Land* is occupied by two central ranges, connected by a transverse ridge, the whole spreading over the south and west of the island, and forming the water-shed of the Derwent and Tamar rivers. The highest summit may probably be about 4000 feet above the sea.

#### THE LOWLANDS.

The interior of Australia appears to consist of a series of vast steppes, covered for miles together with brambles, in some parts with sands, and in a few places with gum trees and cypresses. Along the rivers, however, many fertile spots are found, and also at various points on the low coasts.

#### THE RIVERS.

A remarkable want of rivers is the especial characteristic of Australia. The eastern streams flow in mountain valleys, or in deep channels, through the low-lands. One, the Macquarie, after flowing in a deep and broad channel, is suddenly lost in marshes and sands.

The connected streams, the Murray, Morrum-bidgee, Lachlan, and Darling, are said to have water in their channels through the whole year, and of these the Murray is thought to be 1000 miles long.

#### CORAL FORMATIONS.

The most remarkable of these will be pointed out in the description of the map of the Pacific; but some notice of the great *Barrier Reefs*, to the east of Australia, must be given in this place. The reader will observe the presence of this coral rampart along the whole line of coast, from the Tropic of Capricorn to Torres' Strait, a space of above 1000 miles. It runs at a distance from the land, being at some points 30, and at others 60, miles from the coast. The barrier does not form one continuous wall of coral, but is a succession of numerous reefs, and through the intervening openings vessels pass to the inner sea. The reef is, in some parts, not more than two hundred yards wide, but in others it is nearly a mile. The rolling of the Pacific waters against and over this enormous sea-wall produces the grandest line of breakers in the world.

#### NEW ZEALAND.

The North and South Islands are both remarkable for the extent of their mountain chains. The North is traversed by a volcanic range, one cone of which rises, at Mount Egmont, 8839 feet above the sea. Ruapahu, towards the centre of the island, is about 9000 feet high, and Mount Edgumbe 9630 feet. The South Island is also crossed by chains of considerable elevation.

The longest plain runs to the north of the volcanic range just mentioned, and extends for 60 miles towards the Gulf of the Thames, being in some parts without a tree, in others covered with swamps, but having some fertile districts. Many level or slightly elevated lands are distributed along the coasts, or between the mountain-ranges, which are capable of a profitable cultivation.

### Map X. — The Physical Map of the Pacific.

[For an explanation of the "Stereographic Projection" of a map, see *Nicolay's Physical Geography*, p. 24.]

The object of this map is to bring into one view the greater number of those remarkable island groups, which give so peculiar and interesting a character to the Pacific Ocean.

If we begin our observations at Low Archipelago, 140° W. long. and 20° S. lat., we shall note a continuous succession of island-groups, extending in a broad line across the ocean. These may be divided into two great classes,—the *coral*, and the *volcanic* formations:—

#### THE CORAL FORMATIONS.

There are four classes of these,—the *atolls*, the *encircling reefs*, the *fringing reefs*, and the *barrier reefs*.

*The Atolls*.—These are also called *lagoon* islands, and consist of a ring of coral raised a little above the surface of the water, and enclosing a large area of the ocean within the circle. This

enclosed water is the lagoon, into which entrance is obtained through openings in the coral circle. The space inside of these rocky rings varies considerably, some of the lagoons being only two or three miles in diameter, while others are nearly a hundred miles across. Mud and sand are cast by the ocean on these coral ledges; seeds are dropped by birds, or drifted by the currents; plants spring up; and in the course of years the atoll attracts the people of some neighbouring island, and becomes a well-peopled spot.

The number of these atolls is surprisingly great. In the islands called Low Archipelago, are about eighty of these formations, and the Caroline Archipelago, to the north of New-Guinea, comprehends a group of atolls, extending over 1000 miles. Between the Caroline and Low Archipelagos, the groups of atolls cover the Pacific, extending through the intermediate ocean in the direction of a line forming those two Archipelagos.

*Encircling Reefs.*—These are reefs of coral encircling one or more islands. These coral formations occupy the ocean to the south of the Atoll regions, and can be traced through the Society, the Samoan, the Friendly, the Feejee, and the New Hebrides groups; to which may be added the Ladrões. The best example of a circling reef is the coral ring going round the island of Tahiti, which rises to the height of 7000 feet in the midst of its encircling coral rampant.

*Fringing Reefs.*—These lie close to the shore, forming little more than a series of rocky lines

along the land. They are found in all parts of the Pacific, and are indeed innumerable.

*Barrier Reefs.*—One of the most important of these, that off the coast of Australia, has been already noticed. These reefs do *not encircle* an island like those just mentioned, but extend along the coast like a sea-wall, forming a barrier on one or more sides, but not forming a ring. The Louisiade Archipelago, New Caledonia, and the Pellew group, present examples of such formations.

#### VOLCANIC ISLANDS.

These are of two kinds, some being encircled by coral reefs, as Tahiti; and others standing beyond the coralline region.

The volcanic islands, including both the classes just mentioned, extend over a vast circle. Beginning at the Aleutian chain, near Behring's Strait, the volcanoes are traced through the Kuriles, Japan, Philippines, New-Guinea, New-Hebrides, Feejee Isles, the Tonga, Society, and Marquesas groups, and besides these the Sandwich and other islands must be added. For a more detailed account, see *Nicolay*, p. 118.

#### THE RACES OF THE PACIFIC ISLES.

The principal tribes belong to the Malay family, but New-Guinea, Australia, and the islands to the east, are inhabited by a people called Austral Negroes. The dialects are exceedingly numerous, and one, the language of the Samoans, seems to require only fourteen of our letters to express all its sounds.

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\* \* In the following series of Maps, it will be observed that

Table-Lands and Plateaux are coloured . . .	<i>Brown.</i>
Lowlands, Valleys, &c. . . . .	<i>Green.</i>



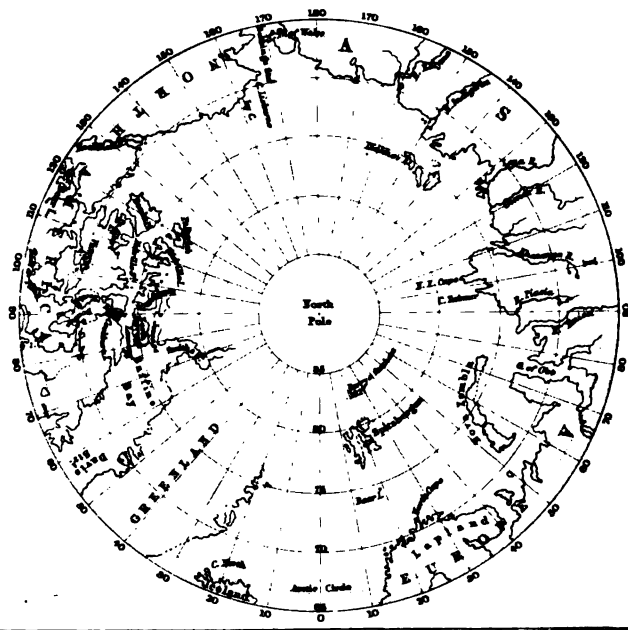
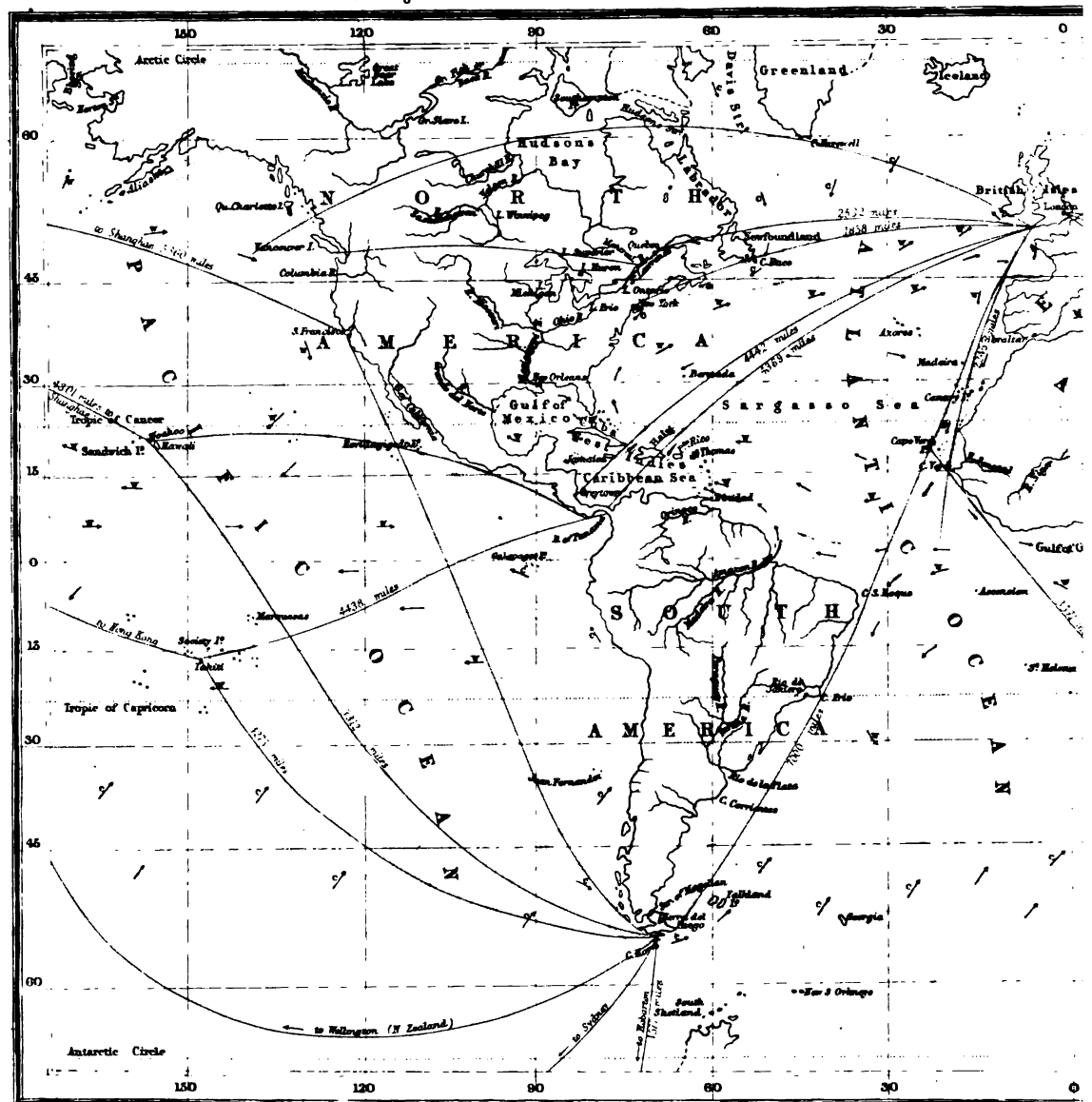


CHART  
**WORLD**  
 (Between the Arctic  
 C  
**MERCATORS**  
 on which  
**GREAT**  
 Showing the  
 between places most impo  
 W  
**CIRCUMPO**  
 of  
**ARCTIC &**  
**REC**

The Ocean Currents are  
 The arrows show their direction  
 attached indicate the w



Designed by the Rev. C. O. Nicolay F.R.S.

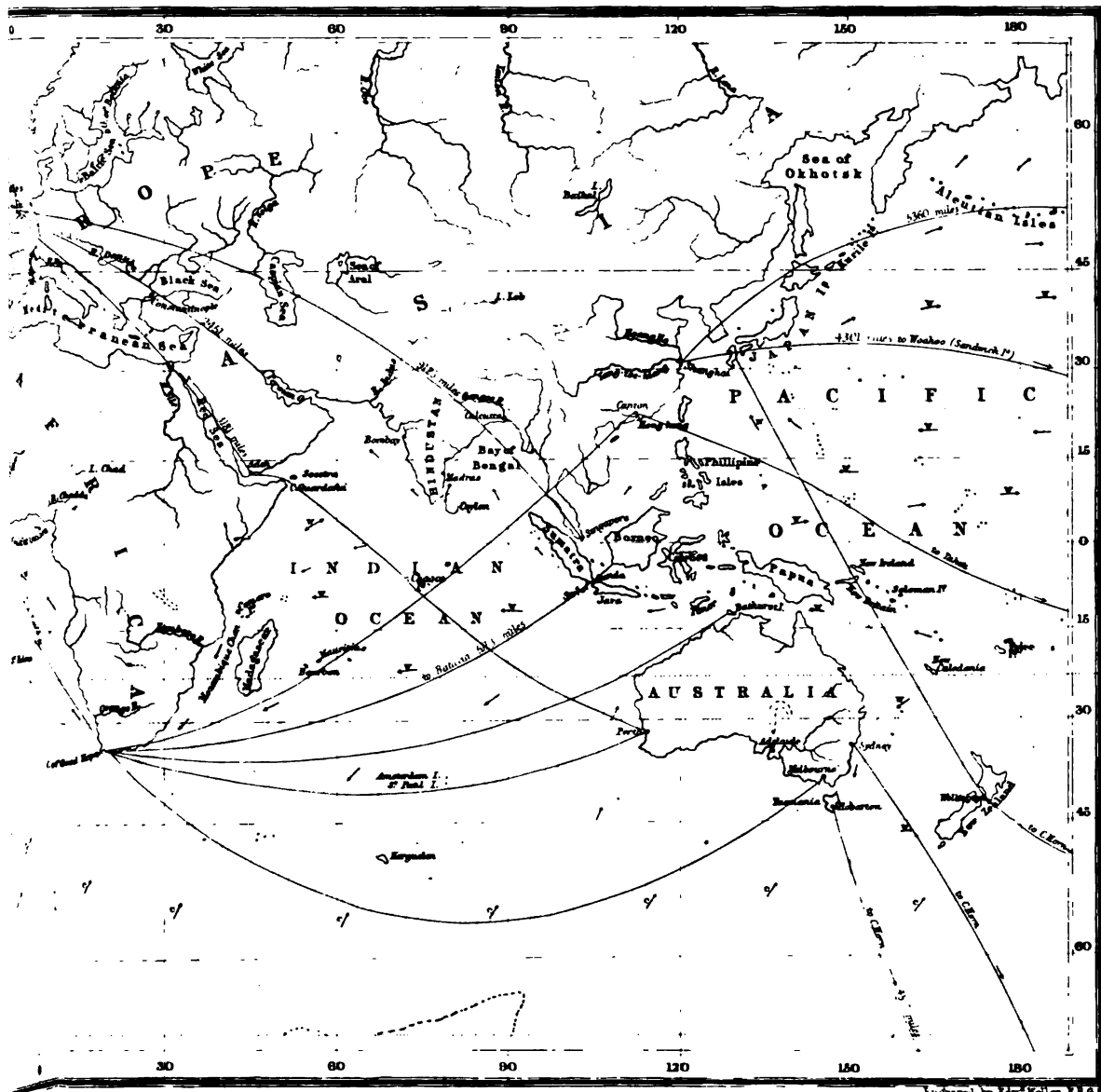
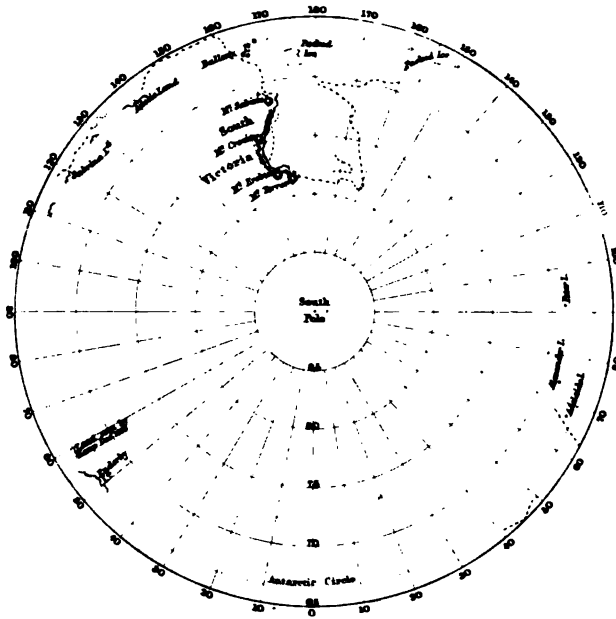
Published by E. P. Williams & B.

OF THE  
WORLD  
(Antarctic Circles)  
ON  
A PROJECTION.

are drawn  
CIRCLES  
shortest Routes  
important to British Commerce.

WITH  
POLAR CHARTS  
of the  
& ANTARCTIC  
REGIONS.

are indicated thus  
— warm & the latter (w & c)  
— cold or cold currents



Engraved by Mr. Waller P.R.S.









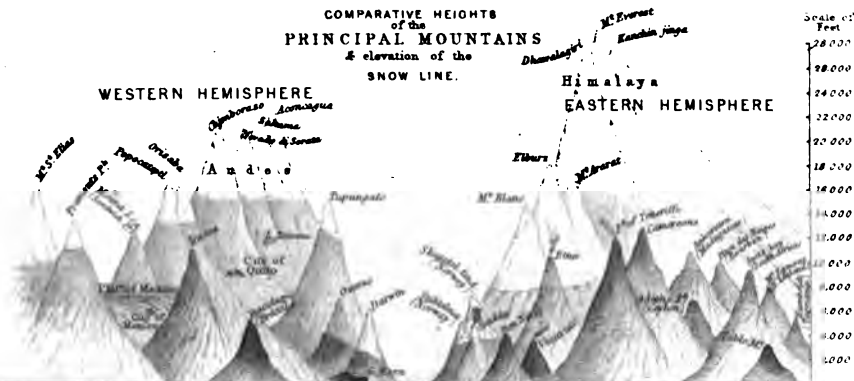
# COLOGICAL OF THE R L D.

(Physical) PLATE 1.

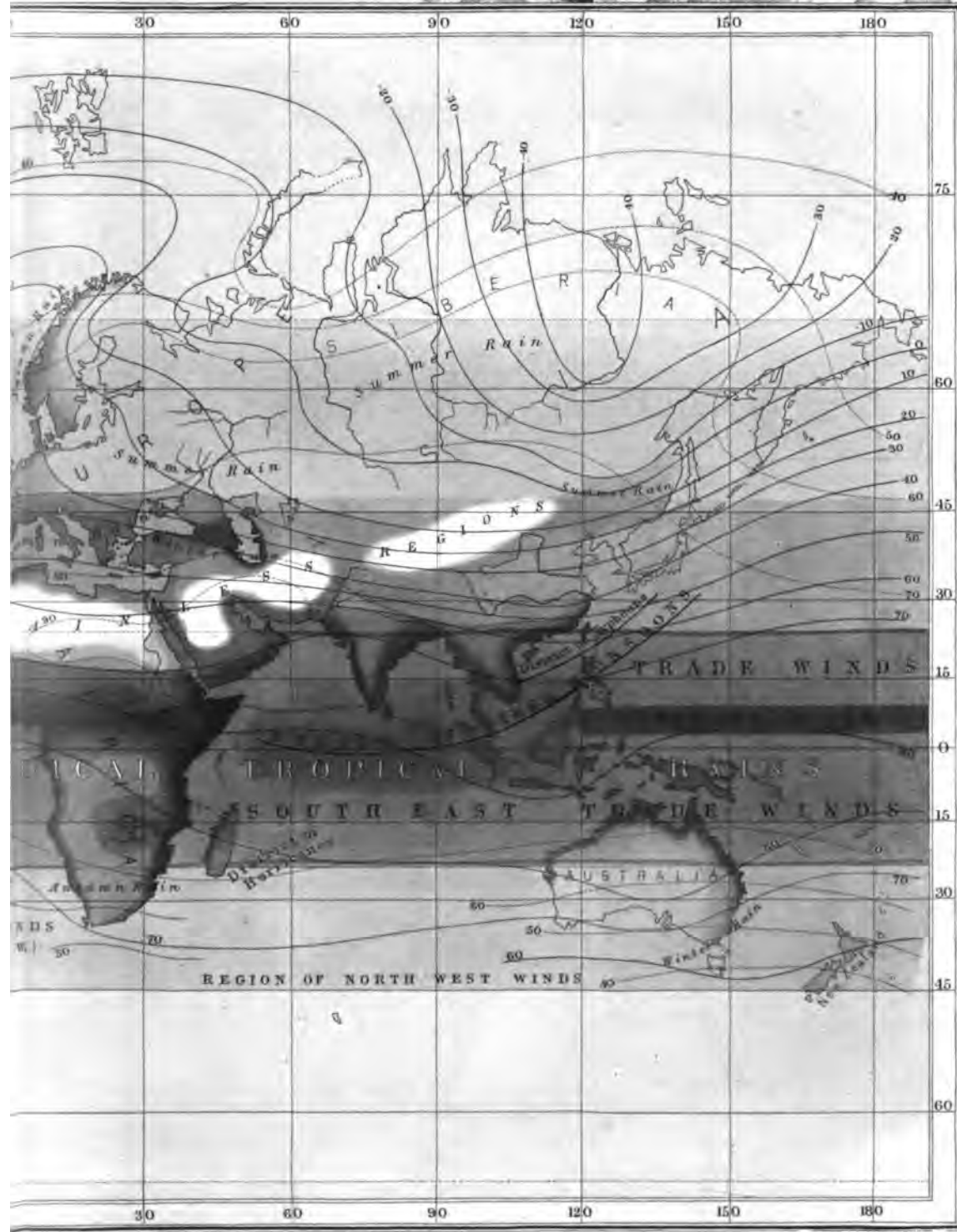
## COMPARATIVE HEIGHTS of the PRINCIPAL MOUNTAINS & elevation of the SNOW LINE.

WESTERN HEMISPHERE

Himalaya  
EASTERN HEMISPHERE



isotherm lines of the month of January  
the month of July



Engraved by East & Weller F.R.G.S.

Printed by Blackie & Co. London & Edinburgh.









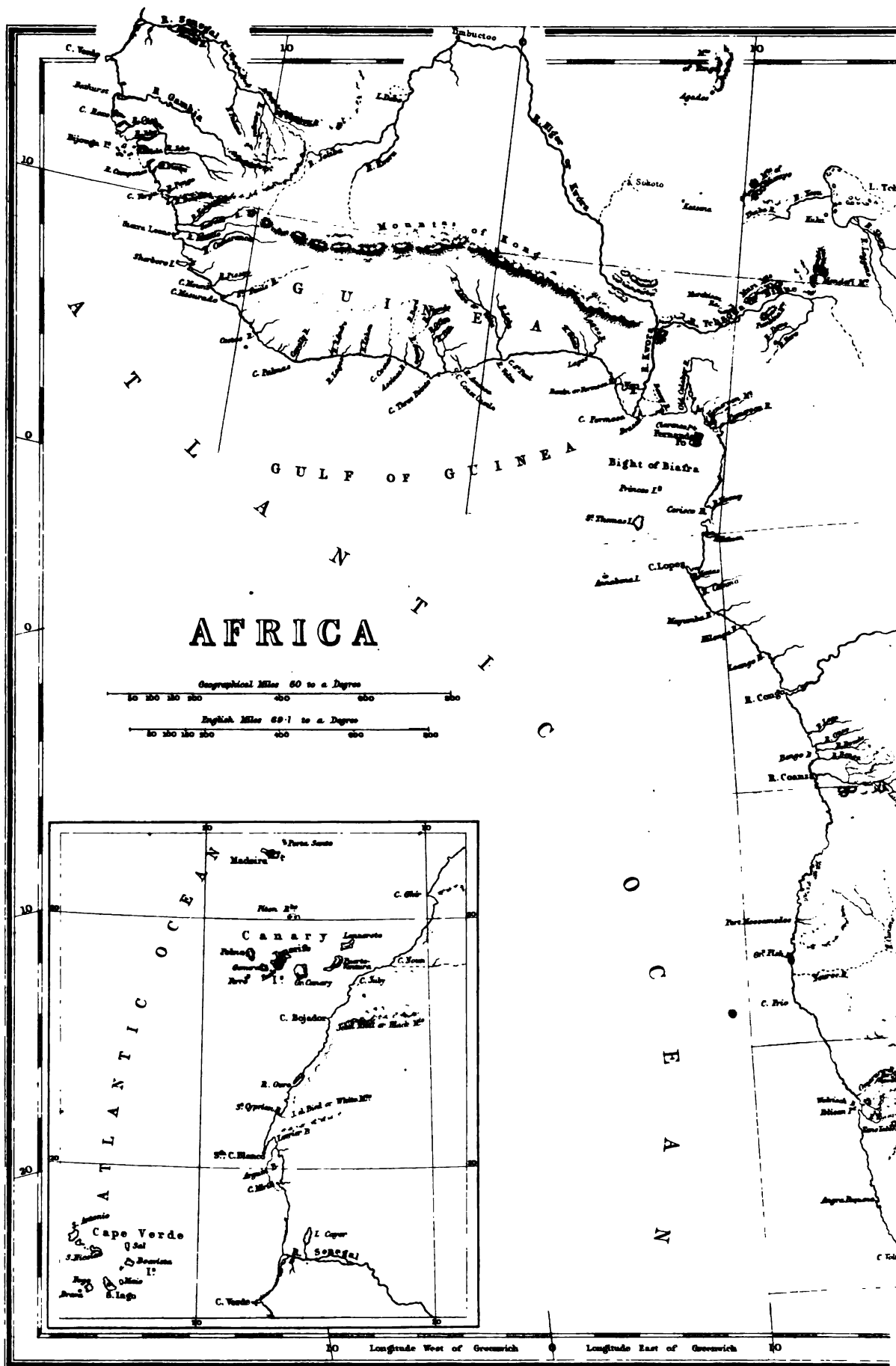




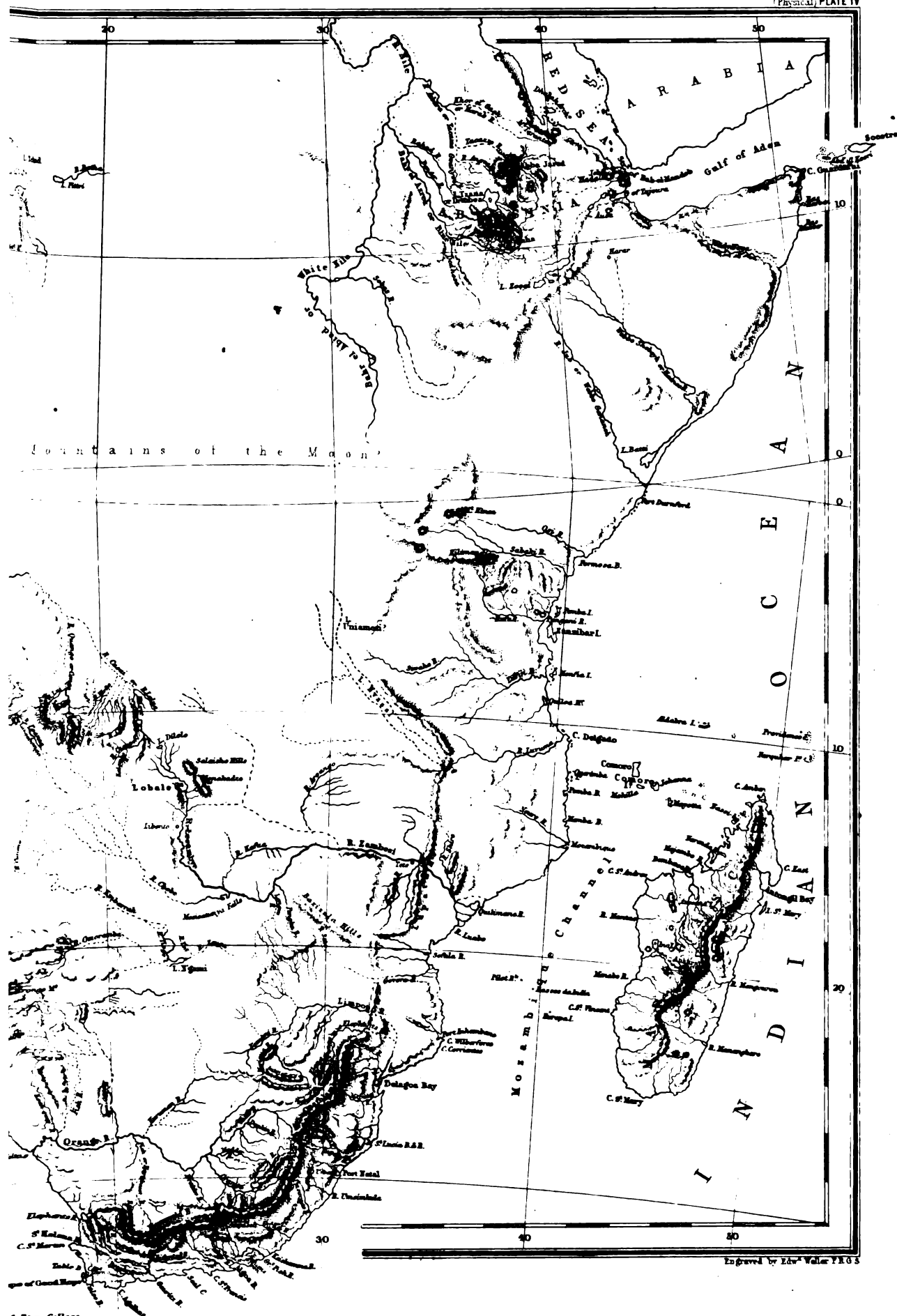








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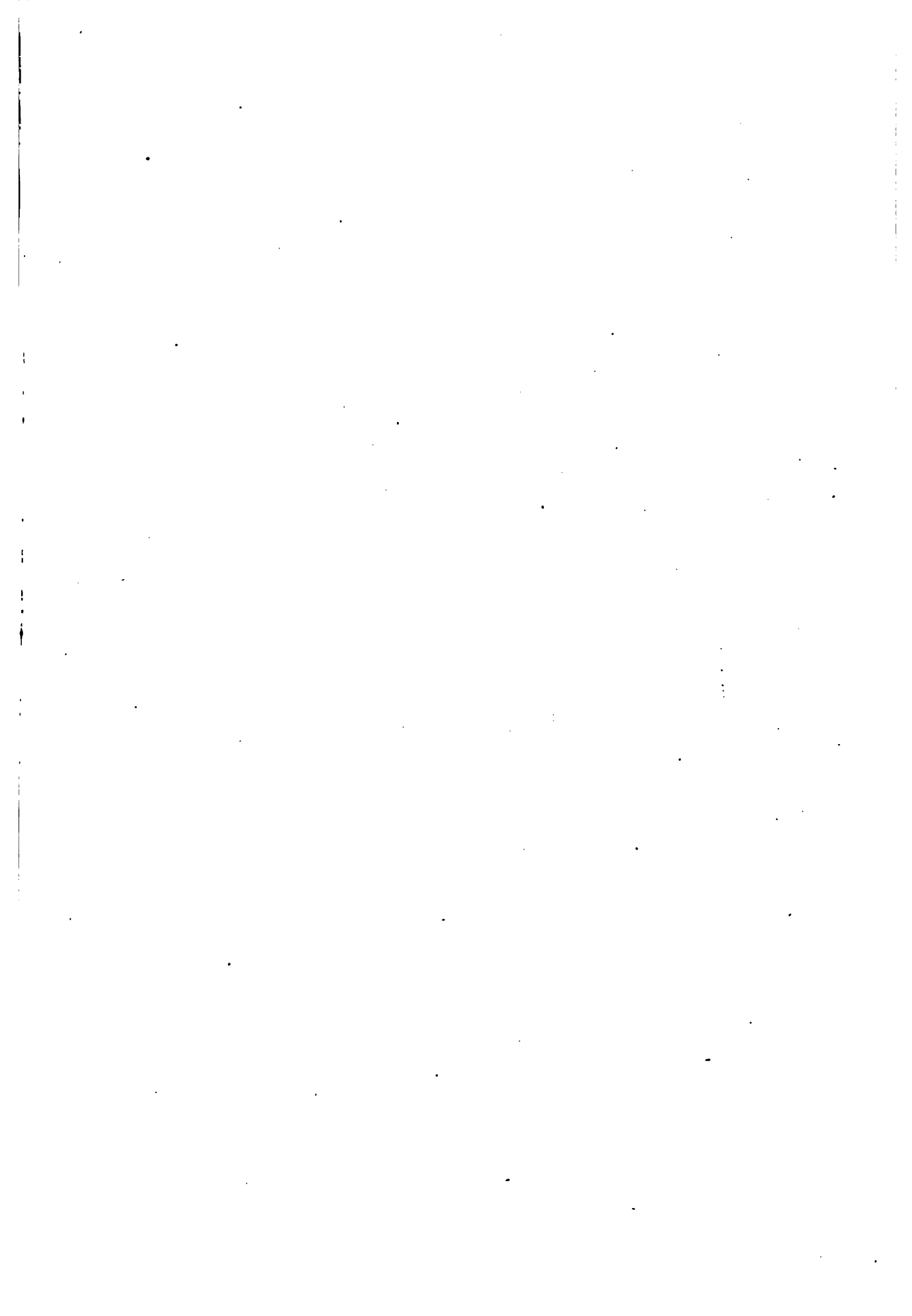






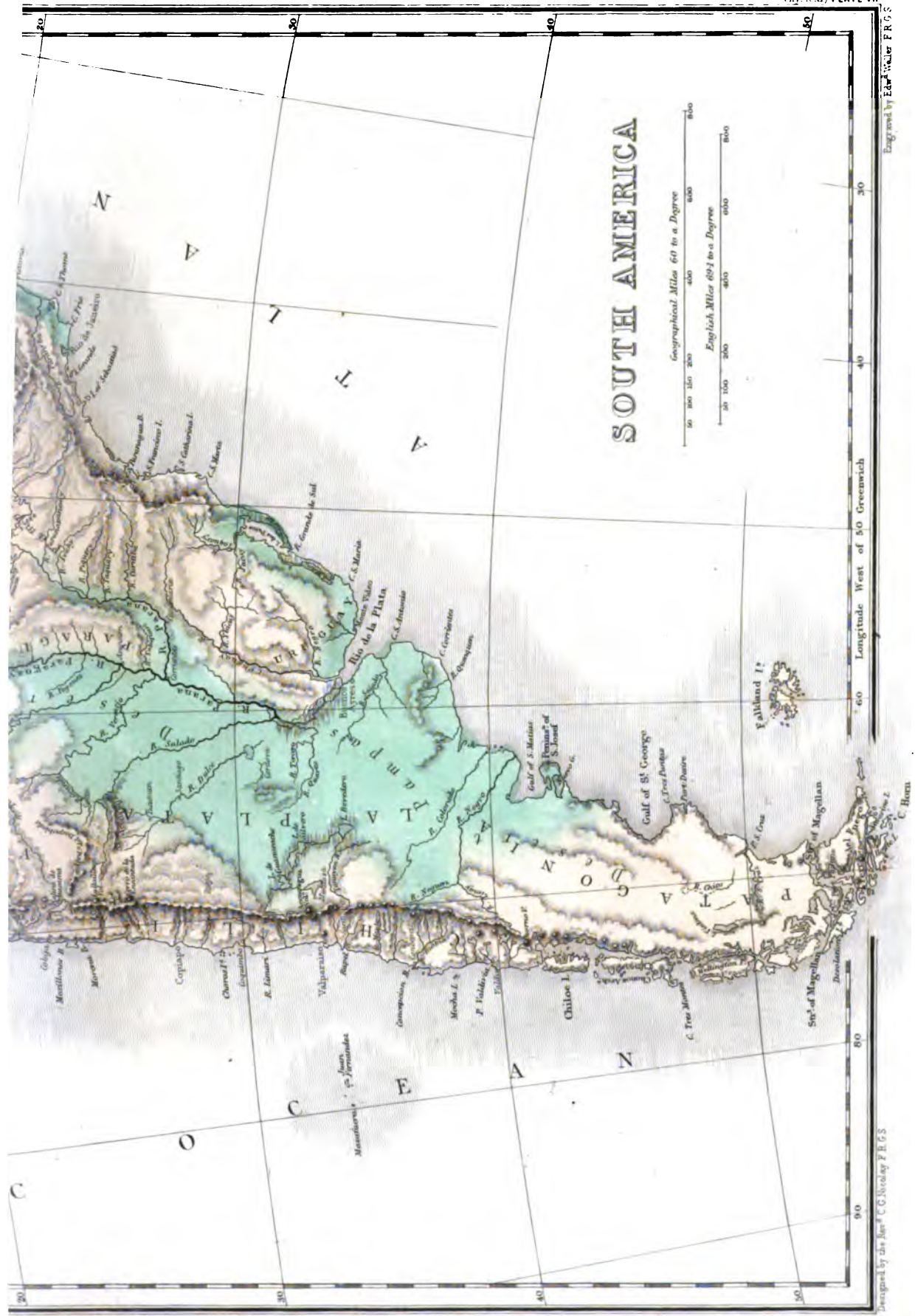










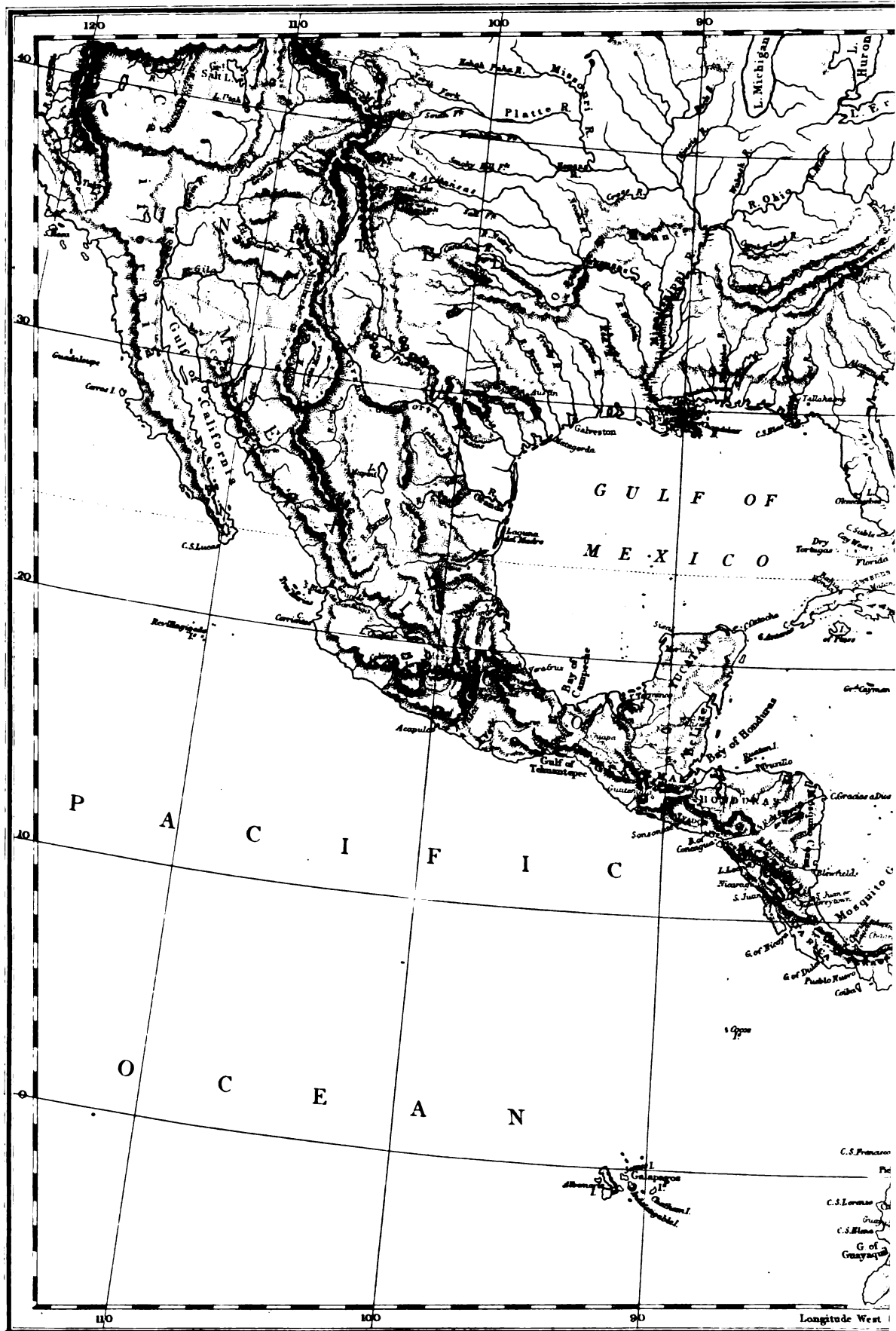


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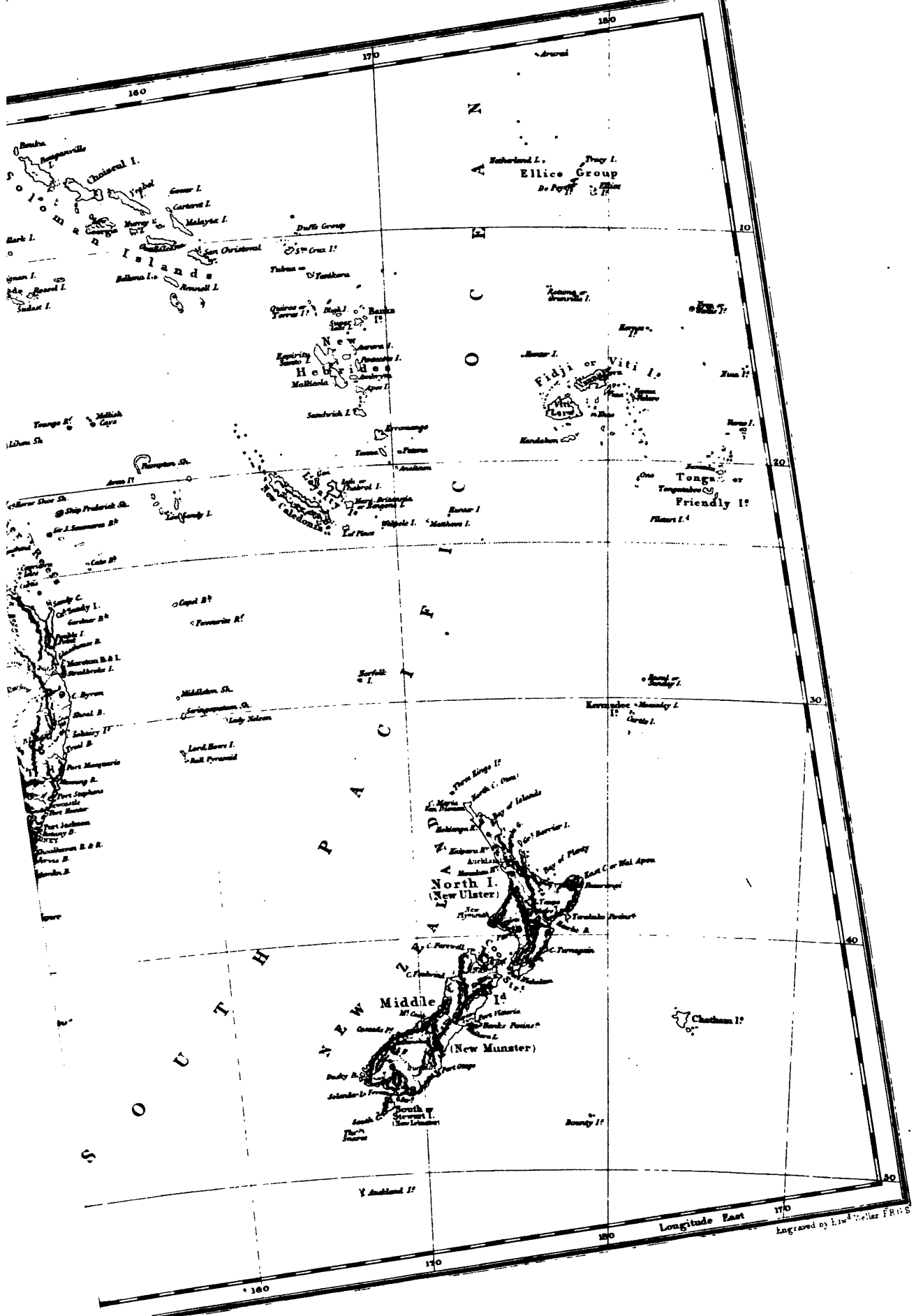


















**THE PACIFIC OCEAN**  
on the  
**STEREOGRAPHIC PROJECTION.**

The map illustrates the Pacific Ocean basin, showing the following regions and features:

- Asia:** Includes the Korean Peninsula, China, Japanese Archipelago, Philippines, and various island groups like the Ryukyu Islands and Micronesia.
- Australia:** Shows the continent of Australia, including New South Wales, Victoria, and Western Australia, along with the Gulf of Carpentaria and the Great Australian Bight.
- Islands and Archipelagos:** Numerous islands are labeled, including the Hawaiian Islands, the Line Islands, the Caroline Islands, the Marshall Islands, the Phoenix Islands, the Johnston Atoll, and the Line Islands.
- Geographical Features:** The map includes labels for various seas, gulfs, and bays, such as the Sea of Japan, the Philippine Sea, the Celebes Sea, the Gulf of Carpentaria, and the Gulf of Victoria.
- Latitude and Longitude:** The map is marked with a grid of latitude and longitude lines, with latitude ranging from 30°N to 30°S and longitude ranging from 120°E to 180°.













